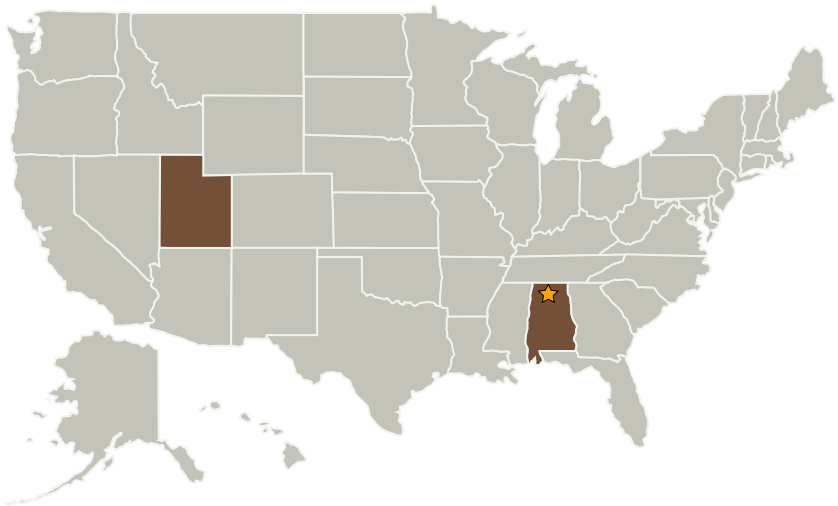
The Cryogenic Impact Resistant Evaluation of Filament Wound Materials for Use in Composite Pressure Vessels, Phase I

Completed Technology Project (2006 - 2007)

Project Introduction

HyPerComp Engineering Inc. (HEI) and Utah State University (USU) propose to develop technology for lightweight composite materials for use in composite structures suitable for both cryogenic and damage tolerant environments. The proposed effort will incorporate previous work performed by HEI in the cryogenic performance of composite materials as well as previously developed improved impact technologies for micro-meteor/space debris survivability. The application of filament wound composite pressure vessels in pressurized storage tanks at cryogenic temperatures has been undertaken at HEI and NASA MSFC with promising results. Likewise, HEI has been conducting research and has patented, jointly with NASA MSFC, a robust impact resistant composite pressure vessel technology. This technology shows great promise in its resistance to performance degradation from impacts, such as those that might be experienced in the space environment in the form of micrometeoroids and space debris. Both of these technologies have been characterized for lightweight composite pressure vessels separately. However, little if any understanding currently exists of their combined potential for both cryogenic and impact resistant composite structures applications, of those including, composite overwrap pressure vessels (COPV's). The combination of the foregoing cryogenic technology with an impact resistant, robust composite pressure vessel technology would be studied. Further, we believe, that combining these two technologies will provide a baseline technology from which to develop a dual-use composite structure. This would be to ensure the integrity of the light weight composite structures, such as cryogenic fuel is stored in an orbiting depot, when exposed to the harsh environment a spacecraft will be expected to encounter during the life of its mission.

Primary U.S. Work Locations and Key Partners



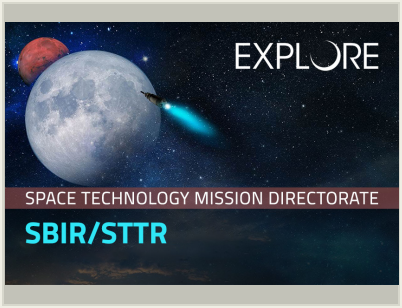


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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
HyPerComp Engineering, Inc.	Supporting Organization	Industry	Brigham City, Utah

Primary U.S. Work Locations	
Alabama	Utah

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jared Noorda

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.3 Power Management and Distribution
    - TX03.3.4 Advanced Electronic Parts